OUR ASTRONOMICAL COLUMN

THE VARIABLE NEBULA NEAR ζ TAURI.—Though there has been no mention of late of observation of the vicinity of the nebula discovered near ζ Tauri on October 19, 1855, by Chacornac, at Paris, and of which he found not the least trace in November, 1862, it may be nevertheless hoped that attention has been directed to the neighbourhood, even if with negative results. As we do not find a sufficiently detailed account of Chacornac's experiences bearing upon this nebula in our astronomical treatises, we may recapitulate them here.

Chacornac tells us that when constructing, at Marseilles, the chart No. 17 of the Atlas employed in the search for small planets, he registered between December 3, 1853, and February 20, 1854, a great number of stars in this part of the heavens, and amongst others he observed, from January 26 to 31, a star of the eleventh magnitude, the position of which for the beginning of 1852 was in R.A. 5h. 28m. 35·6s., and Decl. + 21° 7′ 18″. At that time and later he did not perceive any nebulosity about it; at the Observatory of Paris on September 1 and December 17, 1854, with a refractor of ten inches aperture he did not detect any such appearance. On October 19, 1855, in verifying the chart of this region, he remarked a faint nebula about the star and delineated it upon the map. He was then, as he says, far from thinking that objects generally considered to be masses of small stars could vary in brightness like the isolated variables, and attributed the degree of visibility to the greater or less degree of transparency of our atmosphere. But under the idea that the nebulosity might really be a distant comet, he endeavoured to repeat his observation on following nights, though from clouds and moonlight it was not till November 10 that he could satisfy himself that the object was precisely as he saw it on October 19, having changed neither in position, extent, nor form. It brightness was particularly remarked on January 27, 1856, when it is recorded: "Elle offre l'apparence d'un nuage transparent qui semble reflecter la lumière de l'étoile ζ Taureau, et son aspect tout différent de celui de la nebuleuse 357 (Herschel II.) ne fait naître aucune idée de points stellaires visibles sur toute l'étendu de sa surface. Cette nebuleuse d'Herschel se présente en effet comme un amas d'étoiles qui s'aperçoivent distinctement séparées les unes des autres même avec un faible grossissement, tandis que le souvenir que je garde de la nebuleuse variable ne l'a fait comparer à un leger *cirro-stratus* strié de bandes paralleles : cette description est, du reste, en toute conforme au dessin de la carte."

From the end of January, 1856, until November, 1862, the dates of comparisons of this chart with the sky were not recorded, but on the 20th of the latter month Chacornac failed to see the least trace of the Nebula, though the star of the eleventh magnitude, upon which it was formerly projected, remained of precisely the same brightness. On frequent occasions subsequently, before notifying his discovery in April, 1863, he could see no vestige of nebulosity with the instruments at the Observatory of Paris. With regard to the appearance of the nebula Chacornac remarks: "Elle offrait une forme presque rectangulaire, dont le plus grand côté mesurait un arc de 3 minutes et demie, et le plus petit 2 minutes et demie." The eleventh magnitude, according to his position, precedes ζ Tauri, 12·6s., and is 4′ 26″ north of that star; it appears to be No. 907 of the zone + 21° in the *Durchmusterung*, where it is rated 9·4m., the scale of magnitudes in that catalogue not being identical with Chacornac's.

In the same neighbourhood is a variable star notified by Prof. Julius Schmidt, which follows the bright nebula *h* 357, about 23·8s., with 4′·2 less declination. It is No. 894, zone + 21° in the *Durchmusterung*, and there called 9·5m. According to Schmidt's observations it was 8·9 on February 4, 1861, 11·12 on March 21, 1862, 9 on January 9, 1864, and 10 at the end of the same year; he found its place for 1861·0 in R.A. 5h. 26m. 33·7s., and Decl. + 21° 50′ 47″; a twelfth magnitude follows it 3·7s., about 1′ 18″ to the south.

THE GREAT COMET OF 1880.—Dr. B. A. Gould has calculated a third parabolic orbit for the southern comet which he finds to represent his observations very closely; the elements are:—

Perihelion passage, 1880, January 27·41170 Washington M.T.

	°	′	″	
Longitude of perihelion ...	280	11	10	Mean equinox, 1880·0
,, ascending node	7	7	38	
Inclination	35	12	27	
Log. of perihelion distance..	7·7268724			

Motion—retrograde.

He has also computed an ephemeris for February, from which we extract positions and distances for the period during which the tail was visible.

At Washington mean noon.

	Right Ascension. h.	m.	s.		Declination. °	′		Log. distance from the Earth.		Sun.
Feb. 2 ...	21	47	38	...	−28	57·6	...	9·86856	...	9·53319
3 ...	22	3	4	...	30	8·8	...	9·85728		
4 ...	22	19	12	...	31	10·8	...	9·84799	...	9·62292
5 ...	22	35	54	...	32	3·1	...	9·84064		
6 ...	22	53	1	...	32	44·9	...	9·83521	...	9·69139
7 ...	23	10	24	...	33	15·8	...	9·83167		
8 ...	23	27	52	...	33	35·8	...	9·82994	...	9·74677
9 ...	23	45	13	...	33	44·9	...	9·82997		
10 ...	0	2	17	...	33	43·8	...	9·83165	...	9·79326
11 ...	0	18	55	...	33	33·1	...	9·83487		
12 ...	0	34	58	...	33	13·7	...	9·83949	...	9·83333
13 ...	0	50	20	...	32	47·0	...	9·84538		
14 ...	1	4	57	...	−32	14·0	...	9·85237	...	9·86853

This gives the least distance of the comet from the earth 0·6757 of the earth's mean distance from the sun at about 6h. a.m. Greenwich time on February 9.

THE DIAMETER OF VESTA.—Prof. Tacchini has taken advantage of the recent favourable opposition of this planet to measure the apparent diameter, which with a power of 1,000 on his refractor he found to be, on June 9, 1″·706. This value reduced to the mean distance is about double that resulting from Secchi's observation at the opposition of 1855, when he judged the apparent diameter to be a little less than that of the first satellite of Jupiter, or about 0″·8, but "molto più debole di luce, e di colore ranciato carico." For distance *unity*, Tacchini's measure gives 1″·96, and Secchi's estimate 1″·01. Probably we may hear of other measures of Vesta at the opposition of the present year, made with large instruments.

GEOGRAPHICAL NOTES

THE collections in natural history and ethnography brought home from the coasts of Siberia and Eastern Asia by the *Vega* are to be exhibited in the old hall of the Royal Library at the Palace, Stockholm. The exhibition was opened yesterday, and Baron Nordenskjöld invites naturalists and geographers to visit the collection.

AT the German Athenæum last week the Chevalier Ernst von Hesse Wartegg gave a lecture on his recent travels in North Africa, comprising chiefly the southern parts of Algiers and Tunis and the rarely-visited frontier regions between these two countries. Herr von Wartegg's principal aim was the thorough revision and completion of the very defective Tunisian map of the French General Staff, edited in 1858, and the investigation of the Schott region in Southern Tunis, adjoining the Lesser Syrtes. The first object was, according to the lecturer, satisfactorily completed by the substantial aid of the Tunisian Government and the foreign consular body at Tunis. To point out a few instances of the deficiency of the French maps, Herr von Wartegg mentioned the large river Kassab, a tributary of the Medjerdah, which in the map empties into the Mediterranean about 200 kilometres from its actual mouth. Large lakes are entirely omitted, and cities invented which do not exist. The main fault of the map is the erroneous spelling of the topography, Frenchifying and mutilating nearly every name. For instance, the Arab word Sandjak has been turned into "Saint Jacques," &c. Regarding the well-known project of Capt. Roudaire and M. de Lesseps, the lecturer states that neither the geological formation nor any other sign indicates the former connection between the so-called "submarine basin" in Southern Tunis and Algiers, and he believes, contrary to the sanguine dreams of Capt. Roudaire, that it never was connected with the Mediterranean. According to his observations the submarine basin in the interior approaches the coast only at a distance of about seventy miles, and the canal to be constructed across the isthmus would have to be therefore of that length. The cost of such a work, rivalling the Suez Canal in magnitude, would never be in proportion to the benefit derived, which latter is entirely doubtful. No thorough investigation of the region was ever made, and its results would never be certain, as the constant vibration of the air in this hot climate and the deceptions caused by frequent *fata morganas* render scientific measurements very problematic. If

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the connection between the two basins were to be established, some of the most flourishing cities of the Schott region, like Tooser and Nephta, would be submerged by the floods, and most probably all the large date-tree forests of the Djerid destroyed by the change of climate and the increased moisture. Herr von Hesse Wartegg spoke at length of his travels through the Regency, and mentioned some curious meteorological and botanical observations. The traveller brought back with him a large collection of plants, ethnological objects, and insects, as well as drawings and photographs. He will exhibit his collection at his lecture before the British Association at the forthcoming Swansea meeting.

THE new number of the Geographical Society's *Proceedings* opens with the presidential address on the progress of geography, in which the chief space is devoted to the Arctic regions and Africa; it is supplemented, however, by a summary of Admiralty and Indian surveying operations. A letter is next given from Mr. James Stewart of Livingstonia to the Free Church of Scotland, furnishing a further account of his recent explorations north-west of Lake Nyassa, up to the south end of Lake Tanganyika, and which was accompanied by valuable longitude observations. The latter is illustrated by Mr. Stewart's route surveys, which are of great value from a geographical point of view. Among the notes information is given respecting Dr. Lenz' progress in North-Western Africa, which had reached the Foreign Office through the British Minister at Tangier. Dr. Lenz is stated to have crossed the Atlas, and Moorish protection being refused him beyond Terodant, he has pushed on alone towards Timbuctoo and the Soudan, disguised as a Mohammedan doctor and accompanied by a Moor named Hadj Ali. There are also interesting particulars respecting the movements of a Roman Catholic missionary expedition to the Matabele country and the Upper Zambesi region.

SIGNOR FRACCAROLI, the delegate of a society formed last year at Milan for the development of commerce with Central Africa, has lately paid a visit, in company with Emiliani Bey, to the centre of the Darfur province, which he found in a state of desolation from the recent wars. After a vain attempt to reach the summit of Jebel Si, a lofty isolated peak in the Jebel Marra, he returned to Khartum, whence he expected to proceed on a journey up the Balor el Ghazal.

COUNT LOUIS PENNAZZI is about to undertake a journey in Abyssinia and the neighbouring region. He proposes to start from Massowah and visit the city of Gondar and Mount Debra Tabor, hoping to find King John and obtain from him an escort to accompany him through the Gojam province and to the Blue Nile. Thence he will proceed in a west-south-west direction, following the Sobat and the White Nile along the eighth parallel, and eventually join Signor Gessi.

NEW METALS

WITHIN a period of about two years the chemical world has been startled by the successive announcement of the discovery of no less than fourteen[1] new elementary bodies. All of them are classed as metals, and eleven are said to belong to the yttrium or to the closely-allied cerium group. Without pausing to examine the advisability of announcing the discovery of a new element whenever an unknown reaction crops up, we purpose to give a brief account of these discoveries, and to investigate, as far as possible, what claim they may have to be honoured with a place in our lists of the chemical elements.

In July, 1877, M. Sergius Kern published[2] the discovery of a new metal belonging to the platinum groups, to which he gave the name *davyum*. The davyum was, he said, contained in the latter portions of the platinum ores precipitated by hydrogen at 100° together with the rhodium and iridium. The metals having been heated with barium chloride and chlorine in the usual manner, the rhodium and iridium were fractionally precipitated by acid sodium sulphite, and the davyum contained in the filtrate thrown down with ammonium chloride and nitrate. From this double chloride an ingot of the metal weighing 0·27 gramme was obtained. The properties of this metal and its compounds, as stated by M. Kern, all agree more or less closely with those of the other platinum metals. It is difficultly fusible, dissolves only in *aqua regia*, possesses an atomic weight of about 100, &c. Its specific gravity is, however, said to be 9·38, which is lower than that of any other metal of this group, but approximates to a mixture of rhodium with a little iron. The characteristic reaction is stated to be the red colour produced by potassium sulphocyanate, but unfortunately both iron and ruthenium produce the same result, and M. Kern does not tell us what means he has adopted to get rid of traces of these and the other platinum metals, or to convince himself that they were absent. It is to be regretted that no protest, except a letter of Mr. W. H. Allen,[1] has been raised against this endeavour to foist a "new metal" upon the chemical world, and that too by a chemist who has signalised himself by such inaccurate results in other directions.

Turning now to the recent additions to the yttrium metals, we have in the first place to notice a contribution by Marignac. In the summer of 1878, after examining the earths from gadolinite to establish the existence of terbium, this chemist was induced to attempt a further separation of the erbia obtained in the course of his experiments. These investigations led to the discovery that this pink earth contained another white earth with a somewhat higher atomic weight, and whose salts gave no absorption-spectrum. To the metal contained in this earth the name *ytterbium*[2] was given. These results have recently been fully confirmed,[3] and we may accept the existence of this metal as an established fact. Marignac gave some of his specimens to his colleague, M. Soret, to examine spectroscopically. The latter chemist, operating with sunlight and with a spectroscope of high dispersive power, found that certain lines in their absorption-spectra did not agree with those of erbia, and that this was particularly the case with regard to the violet and ultra-violet portions of the spectra. From these results he was led to suspect the presence of two new earths, one of which he named provisionally X, leaving the other unnamed.[4] All attempts to separate either of these earths were, however, futile.

Shortly afterwards Lawrence Smith published[5] the results of some investigations on these earths obtained from the mineral samarskite, abundant in North Carolina and other American localities, instead of from gadolinite. As the result of his investigations he announced the discovery of a new earth, to which, however, he gave no name. It was, he said, a yellow earth possessing most of the properties of terbia, but differing from it in some reactions. Marignac, who received a sample of this earth, found,[6] on examining it, that its properties did not differ appreciably from those of terbia, and we may very well accept the verdict of this distinguished chemist. Lawrence Smith also stated that the earth called X by Soret had been discovered by him in samarskite about a year previously, and had been named *mosandrum*. He has since admitted[7] that the salts of this metal give no absorption-spectrum, and he has furnished us with no details as its special properties, mode of separation, &c., which are conclusive enough to admit of its immediate recognition as a new metal.

We now come to a number of "new" metals all belonging to the same group, and mainly distinguished by slight differences in the absorption-spectra of their salts and in their atomic weights. The earth named X by M. Soret, as well as the one he left unnamed, have been already referred to. Besides these, two new metals have been announced by M. Delafontaine,[8] which he has named *phillipium* and *decipium*. The former is a yellow earth with an equivalent between that of yttria and terbia, the latter a white earth with a higher equivalent; both possess indistinct absorption-spectra. M. Soret, who has examined the absorption-spectra very carefully, thinks it probable[9] that the mixture formerly known as erbia may contain phillipia or his unnamed earth, together with the earth X and the real erbia, besides other earths giving no absorption-spectra. Of decipium we have no confirmation. These earths have also been investigated by Cleve, in conjunction with Thalén. They came to the conclusion that there are three distinct earths which yield absorption spectra in the old erbia.[10] These they named *thulium*, *holmium*, and the real *erbium*. Subsequently they have admitted[11]

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[1] M. Lecoq de Boisbaudran's *gallium*, the existence of which has now been fully established, is not included in this number.

[2] *Chemical News*, vol. xxxvi. p. 4.

[1] *Chemical News*, vol. xxxvi. p. 33.

[2] *Arch. des Sci., phys. et nat.*, vol. lxiv. p. 101.

[3] Nilson, *Ber. d. deut. ch. Gesell.*, v. xii., p. 550; Humpidge, Brit. Ass. Reports for 1879; Lecoq de Boisbaudran, *Comp. Rend.*, vol. lxxxviii. p. 1342.

[4] *Arch. des Sci., phys. et nat.*, vol. lxiii. p. 99.

[5] *Comp. Rend.*, vol. lxxxvii. p. 146.

[6] *Arch. des Sci., phys. et nat.*, vol. lxiii. p. 172.

[7] *Comp. Rend.*, vol. lxxxix p. 478.

[8] *Comp. Rend.*, vol. lxxxvii. pp. 559, 632.

[9] *Arch. des Sci., phys. et nat.*, vol. lxiii. p. 99.

[10] *Comp. Rend.*, vol. lxxxix. p. 478.

[11] *Ibid.*, vol. lxxxix. p. 708.

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